

REMARKS:Response to Objections to the ClaimsClaims 9, 16

Claims 9 and 16 have been rejected under 35 USC 112, second paragraph, as being indefinite because the independent claims from which they depend recite the material in the singular sense. The independent claims (1, 12) from which claims 9 and 16 depend have been amended to recite that the upper layer includes *at least one* material selected from the group consisting of NiFe and CoFe. This amendment is believed to clarify any indefiniteness. Applicants respectfully request that the Examiner withdraw the objection.

Claims 4, 9, 11, 15-16, 19-20

Claims 4, 9, 11, 15-16, 19-20 have been rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement.

Regarding claims 9 and 16, the Examiner is directed to p. 13, lines 6-8 which indicates that the sensor can include a layer of NiFe and CoFe over the underlayer:

“In one embodiment, the upper layer 508 may include NiFe, CoFe, or any combination thereof with any desired elements.”

Regarding claims 4, 19-20, Applicants believe that doping inherently includes addition of a material other than the material being doped, for if a material is doped with itself, no effect would be observed.

Regarding claim 15, the reference to the different material has been removed.

Regarding claim 11, the Examiner is directed to p. 15, lines 18-20, which indicates that the upper layer can be nonmagnetic:

“Such detrimental effects could likely be prevented by using a non-magnetic, high-resistivity (e.g., appropriately doped NiFe or CoFe) upper layer 508.”

Therefore, Applicants respectfully request that the objection to the claims be withdrawn.

Because claims 4, 9, 15-16, 19-20 have no other basis for rejection indicated in the office action, Applicants respectfully request allowance of these claims.

Response to Rejection of the Claims

Claims 1, 2, 5-8, 11, 21 have been rejected under 35 USC 102(e) as being anticipated by Mao et al. (6,490,140, hereinafter “Mao”).

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Claims 1, 20, 21 have been amended to show the increase in $\Delta R/R$ (%) that is achieved by the present invention. As shown in FIG. 6 of the present application, the $\Delta R/R$ is increased from 7% to 12.8% by addition of the upper layer, a gain of 5.8% $\Delta R/R$. Claim 20 further requires that the sensor have only a single pinned layer.

In contrast, Mao shows an increase of $\Delta R/R$ by addition of the underlayer to similar structures of only 2.7%. Particularly, FIG. 8 of Mao shows the $\Delta R/R$ for a structure having no underlayer. The $\Delta R/R$ is 10.3%. FIG. 9 of Mao shows the $\Delta R/R$ for a structure having an underlayer. The $\Delta R/R$ is 13%.

It can thus be seen that the teachings of the present invention provide a much greater increase in $\Delta R/R$ as compared to Mao's structures. In fact, this degree of improvement in $\Delta R/R$ is not found in the prior art. As known to those of skill in the art, a high GMR ratio is essential to improving the performance of spin valve sensors. Allowance of claim 1 and all claims depending therefrom (claims 2-11) is respectfully requested.

Claims 3, 17, 18

Claims 3, 17, 18 have been rejected under 35 USC 103(a) over Mao.

Regarding claims 3, 17, 18, Applicants respectfully disagree with the Examiner's assertion that the claimed upper limit on the thickness of the upper layer should be considered encompassed by Mao's disclosure.

First, as shown in FIG. 6 of the present application, an underlayer of 3-5 angstroms provides an increase in $\Delta R/R$ of over 5%. In sharp contrast, addition of Mao's upper layer shows only a 2.7% change in $\Delta R/R$ (see arguments above). Thus, the claimed structures are an improvement over Mao's disclosure, providing almost twice the increase in $\Delta R/R$ with a thinner layer.

Second, Mao indicates that the more preferred thickness is 10 Å. This teaches away from the disclosed lower limit of 5 Å.

Claims 10, 12-14

Claims 10, 12-14 have been rejected under 35 USC 103(a) over Mao in view of Huai et al. (US 6,222,707). Applicants respectfully disagree that the combination of Mao with Huai would render the claims obvious.

The analysis of obviousness was set forth in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966). In order to establish a *prima facie* case of obviousness, three basic criteria must be met:

First, there must be some *suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references. Second, there must be a reasonable *expectation* of success. Finally, the prior art reference or combined references must teach or suggest *all* the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success *must both be found in the prior art*, and not based

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on applicant's disclosure (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991; emphasis added).

Applicant respectfully disagrees that Mao and Huai would suggest or motivate one skilled in the art to combine the teachings of Mao and Huai to create Applicants' claimed head, particularly as claimed. Applicants first note that the Examiner correctly points out that Mao does not recite another alternative material in place of Cr in the NiFeCr seed layer. That is because Mao indicates that a layer of NiFeCr is critical to the functionality of Mao's structure. The Examiner is directed to col. 3, lines 40-46 of Mao, where Mao states that his invention is a combination of a NiFeCr seed layer and a PtMnX pinning layer. Therefore, it cannot be said that Mao's teachings would suggest or motivate one skilled in the art to combine the teachings recited therein with Huai's disclosure to substitute the Cr in the NiFeCr with another material, as a NiFeCr seed layer is the basis for the invention.

Likewise, Huai merely recites use of a seed layer of NiFeX, where X can be Cr or one of several other materials. However, Huai does not disclose addition of an upper layer thereto between the seed layer and the AFM layer. Thus, a similar argument could be made that Huai is very different from Mao's structure, and therefore could not suggest or motivate one skilled in the art to substitute the Huai's seed layer in Mao's structure. There is no suggestion or motivation that implementing Huai's seed layer materials would even function in Mao's structure, much less. Thus, it cannot be said that Sakakima suggests or motivates combining the teachings recited therein with Lederman's disclosure for creation of a recording head, absent Applicant's disclosure.

Nor has the Examiner provided a reasonable motivation based on knowledge generally available to those skilled in the art and not provided by Applicants in the present disclosure, particularly with regard to claim 13.

"To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd.Pat.App.&Inter.1985).

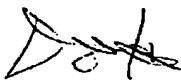
Here, the Examiner has indicated that the motivation is that one of skill in the art would have found other materials to use in place of Cr in the NiFeCr through routine engineering experimentation and optimization. Applicants respectfully submit that because Mao's and Huai's structures were completely functional and new and novel as indicated by issuance of patents thereon, one skilled in the art would not have been motivated to seek other materials of equivalent functionality, and therefore the Examiner's line of reasoning is not convincing. The only conclusion that can be drawn is that the combination of features proposed by the Examiner has been drawn from Applicants' disclosure.

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Because the combination of Mao with Huai does not meet the *Graham* test, allowance of claims 10, 12-14 is respectfully requested.

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-2587 (Order No. SJO920000121US1).

Respectfully submitted,

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